# California Regional Water Quality Control Board

## Central Valley Region

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**TO:** Thomas C. Maurer, Branch Chief
Environmental Contaminants Division
Sacramento Fish and Wildlife Office
U.S. Fish and Wildlife Service
2800 Cottage Way, Room W2605
Sacramento, California 95825

**FROM:** Chris Foe, PhD.
Staff Scientist

**SIGNATURE:**

**DATE:** 14 November 2005

**SUBJECT: METHYL MERCURY CONCENTRATIONS IN MUD SLOUGH, SAN LUIS DRAIN, AND REFUGE WETLANDS**

The U.S. Fish and Wildlife Service asked about recent Regional Board methyl mercury monitoring results for Mud Slough, the lower portion of the San Luis Drain that is being used by the Grassland Bypass Project (GBP), and Refuge wetlands. Below I include a little background as to why staff is monitoring methyl mercury in Mud Slough and a table containing the data obtained to date.

The San Joaquin River between Vernalis and Bear Creek is on the State of California 303(d) list because of elevated concentrations of mercury in fish tissue. Greater than 95 percent of the mercury in fish is methyl mercury. Methyl mercury is a potent neurotoxin. The primary route of exposure is from consumption of mercury-contaminated fish. Life forms most at risk are human and wildlife fetuses and young. Statistically significant positive correlations exist in Cache and Guadalupe Creeks and the Sacramento-San Joaquin Bay Delta Estuary between annual average unfiltered methyl mercury concentrations in water and in fish caught in the fall. The relationship suggests that aqueous methyl mercury concentrations are an important factor controlling methyl mercury bioaccumulation in aquatic biota. The proposed safe methyl mercury TMDL goal to protect people and wildlife consuming fish in the Delta is 0.06 ng/l.

Regional Board staff has been monitoring methyl mercury concentrations in the San Joaquin watershed for the past two years to identify sources and to characterize concentrations and loads. The highest concentrations in the Basin occur in Mud Slough downstream of the inflow from the San Luis Drain (GBP monitoring site D). Methyl mercury loads in Mud Slough are sufficiently high that they may account for 40-60 percent of the Vernalis load during non-irrigation season. Similar calculations have not been made for the irrigation season as the amount of water removed and returned to the River by water agencies and others is not known. However, Mud Slough concentrations and loads remain high suggesting that the Slough is still a significant source of River methyl mercury. The non-irrigation season loads imply that Mud Slough is responsible for about half the methyl mercury accumulating in fish in the main stem San Joaquin River in winter. The source of the methyl mercury in Mud Slough is not known.

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Regional Board staff has commenced a mass balance study to better define the primary source(s) of methyl mercury in Mud Slough. Staff hypothesis is that the wetlands are a major source based upon finding in the Bay-Delta Estuary and peer-reviewed literature. Key sampling sites to better define the sources of methyl mercury are above the marshes at Wolfsen Road and at Pozo Canal and the Johnson Field drain and downstream in Mud Slough at Site D. Staff are also sampling the Grassland Bypass near its discharge point into Mud Slough.

Table 1 summarizes methyl mercury concentrations obtained to date in the Drain. Data for the San Joaquin River at Vernalis and for Mud Slough at site D are also included for comparison. The results suggest that methyl mercury concentrations at all three sites are elevated and may constitute a heath hazard to wildlife consuming local fish. Methyl mercury mass balance calculations have not yet been made for Mud Slough.

Table 1. Summary of unfiltered methyl mercury concentrations (ng/l) in the Grassland Bypass portion of the San Luis Drain, Mud Slough at Site D and San Joaquin River at Vernalis.

| Date | San Luis Drain @ Site B | Mud Slough @ Site D | San Joaquin @ Vernalis |
|---|---|---|---|
| 6/14/05 | 0.302 | 0.671 | 0.235 |
| 7/13/05 | 0.648 | 0.769 | 0.218 |
| 8/9/05 | 1.150 | 1.430 | 0.226 |
| 9/12/05 | 0.846 | 1.070 | 0.062 |

Please call me at 916-464-4713 if you have questions.

CC: Joseph McGahan, Summers Engineering, Hanford.
Mike Delamore, U.S. Bureau of Reclamation, Fresno.
Don Marciochi, General Manager, Grassland Water District, Los Banos.
John Beam, Manager, Los Banos Wildlife Refuge, Los Banos.